Notice of Allowability	Application No.	Applicant(s)	
	09/811,904	TORTI ET AL.	
	Examiner	Art Unit	
	Zia R. Hashmi	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *11/10/03*.
2. ☒ The allowed claim(s) is/are *1-51*.
3. ☒ The drawings filed on *19 March 2001* are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____.
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
   (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No. ____.
   (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.
   (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the margin according to 37 CFR 1.121(d).

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1☐ Notice of References Cited (PTO-892)
2☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No. _____
4☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5☐ Notice of Informal Patent Application (PTO-152)
6☐ Interview Summary (PTO-413), Paper No._____.
7☐ Examiner's Amendment/Comment
8☒ Examiner's Statement of Reasons for Allowance
9☐ Other

DETAILED ACTION

Allowable Subject Matter

1. A response to Office Action of August 6, 2003, was received on November 10, 2003.

2. Claims 1-51 are allowed.

3. The following is an examiner's statement of reasons for allowance:

With respect to independent claims 1, 14, 27, 35, and 42, prior art fails to disclose a gas cluster ion beam detector for measuring the properties of a gas cluster ion beam comprising: a source for producing a gas cluster ion beam comprising ionized and un-ionized gas clusters; a detector for measurement of properties of the gas cluster ion beam; a dissociating means within the enclosure for dissociating gas cluster ion beam into molecules; means for operably controlling the ion beam and the detector; beam switching means for selectively controlling the ionized and unionized portions of the gas cluster ion beam; a charge/current and pressure measuring devices located within the enclosure, and means for adjusting parameters of the gas cluster ion beam processing system based on the measured properties.

The use of gas cluster ion beam (GCIB) for etching, cleaning, and smoothing of surfaces of various materials is known in the prior art. Gas clusters are nano-sized aggregates of materials that are gaseous under standard temperature and pressure. Clusters can be made sufficiently energetic to effectively etch, smooth or clean surfaces. In order to maximize the utility of a GCIB for surface processing, it is useful to know and control both energy of the clusters and the mean cluster size, or cluster size

distribution. In certain applications, gas cluster ion beams are used for deposition and growth of surface films. When so used, it is important to know the mass flow to the workpiece. For these and other reasons, it is important to have measurement means of cluster size in an ion beam. For example, low energy un-ionized clusters and molecules do not participate substantially in processing a workpiece. For this reason, it is useful to have a measure of their magnitude.

The present invention provides a simple, compact, and inexpensive means of measuring the mean cluster mass for diagnosing operation of a cluster source and ionizer. The invention involves a detector for measuring the size of the cluster ions, which includes an electron suppressed Faraday cup with a high conductance path, to a neutral gas pressure detector and a high conductance to the detector exit. The apparatus is both used to acquire ion current and beam flux, the latter through a pressure measurement. Since the pressure measurement responds to the completely dissociated clusters in real time, when combined with the information of instantaneous ion current, the mean cluster size can be calculated.

Claims 2-13, 15-26, 28-34, 36-41, and 43-51 are allowed by virtue of their dependencies on independent claims 1, 14, 27, 35, and 42.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zia Hashmi whose telephone number is (703) 305-0419. The examiner can normally be reached between 8.30 AM- 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (703) 308-4116.

Zia Hashmi

January 12, 2004.

JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800